IEEE Computational Intelligence Society

Mizzou Chapter

Conservation of Information in Evolutionary Search Algorithms: Measuring the Cost of Success

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Date and Time: Monday, November 13, 2007 at 4:00 PM
                        Refreshments at 3:30
Place: Ketcham Auditorium, Nell Lafferre Hall

Abstract: Conservation of information theorems indicate that any search algorithm performs on average as well as random search without replacement unless it takes advantage of problem-specific information about the search target or the search-space structure. Combinatorics shows that even a moderately sized search requires problem-specific information to be successful. Three measures to characterize the information required for successful search are (1) endogenous information, which measures the difficulty of finding a target using random search; (2) exogenous information, which measures the difficulty that remains in finding a target once a search takes advantage of problem-specific information; and (3) active information, which, as the difference between endogenous and exogenous information, measures the contribution of problem-specific information for successfully finding a target. A methodology is developed based on these information measures to gauge the effectiveness with which problem-specific information facilitates successful search. It then applies this methodology to various search tools widely used in evolutionary search.

Biography: Robert J. Marks II, Ph.D., is Distinguished Professor of Engineering in the Department of Engineering at Baylor University. He was attracted to Baylor University after 26 years at the University of Washington in Seattle by Baylor's visionary 2012 initiative.

Robert J. Marks II has 300 publications. Some of them are good. He has eight books (author, co-author, editor or co-editor), including Neural Smithing (MIT Press \u2013 with Russ Reed) and the Handbook of Fourier Analysis and Its Applications (Oxford University Press \u2013 in press).

Marks is the recipient of numerous professional awards, including a NASA Tech Brief Award and a best paper award from the American Brachytherapy Society for prostate cancer research. He is Fellow of both IEEE and The Optical Society of America. His consulting activities include Microsoft Corporation, Pacific Gas & Electric, and Boeing Computer Services. His research has been funded by organizations such as the National Science Foundation, General Electric, Southern California Edison, EPRI, the Air Force Office of Scientific Research, the Office of Naval Research, the Whitaker Foundation, Boeing Defense, the National Institutes of Health, The Jet Propulsion Lab, Army Research Office, and NASA.

Professor Marks was awarded the IEEE Outstanding Branch Councilor Award, The IEEE Centennial Medal, the IEEE Neural Networks Society Meritorious Service Award, and the IEEE Circuits and Systems Society Golden Jubilee Award. He was named a Distinguished Young Alumnus of Rose-Hulman Institute of Technology and is an inductee into the Texas Tech Electrical Engineering Academy. Prior to coming to Baylor, Dr. Marks served for 17 years as the faculty advisor to the University of Washington's chapter of Campus Crusade for Christ.